State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: November 16, 2020 (Revised April 6, 2021) FILE REF: 3400

TO: File

FROM: Alan Hopfensperger - SCR

SUBJECT: Groundwater Evaluation and Exceedance Report for Seneca Foods, Mayville
WPDES Permit # 0050822-08 reissuance

The Seneca Foods Mayville Land Treatment Spray Irrigation System is divided into the following Spray Irrigation groups:

Spray Field A

Spray Field A located west of the Seneca Foods Mayville plant and north of Field B is no longer used.

Fields B, C, D, E, and F

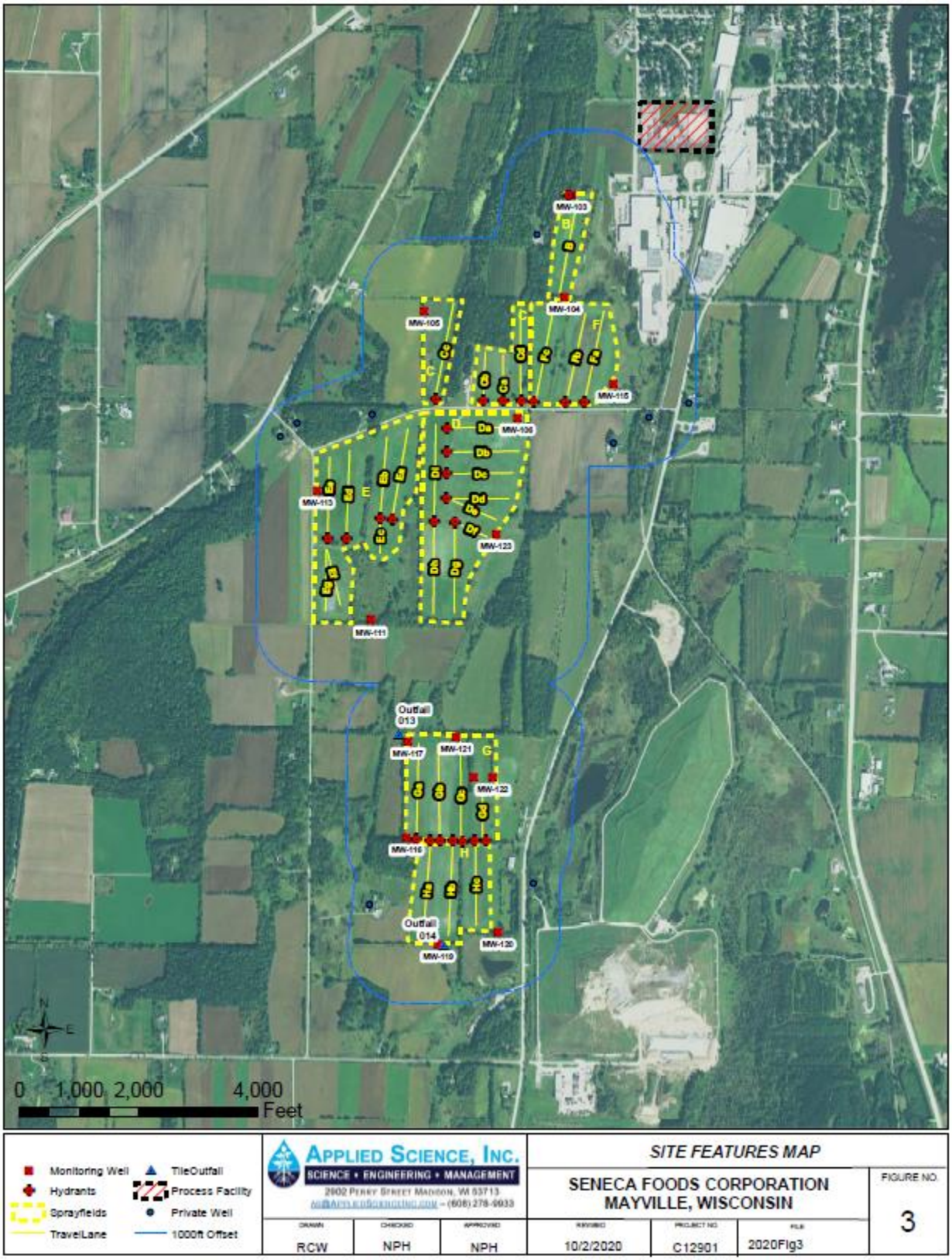
Fields B, C, D, E and F are monitored by wells W-103 (816), W-104 (817), MW-105 (818), MW-106 (806), W-108 (808), W-111 (811), W-113 (813) and W-115 (819) and W-123(893). MW-113 is current considered the background well as it is the most upgradient well based on the groundwater flow gradient of the current groundwater monitoring system. W-106 (806), W-104 (817), W-108 (808), W-111 (811), W-115 (819) and W-123(893) are downgradient wells, W-103 (816) is side gradient and 105(818) can be considered an upgradient well. Monitoring wells W-106 (806), W-104 (817), W-108 (808), W-115 (819) and W-123(893) are within the Design Management Zone and W-103 (816), W-111 (811) are considered enforcement standard wells based on their distance from edge of the land treatment system and/or location in relationship to the site (property) boundary. Note: W-108 (808) was abandoned during the permit term and replaced by W-123(893).

South Fields G and H

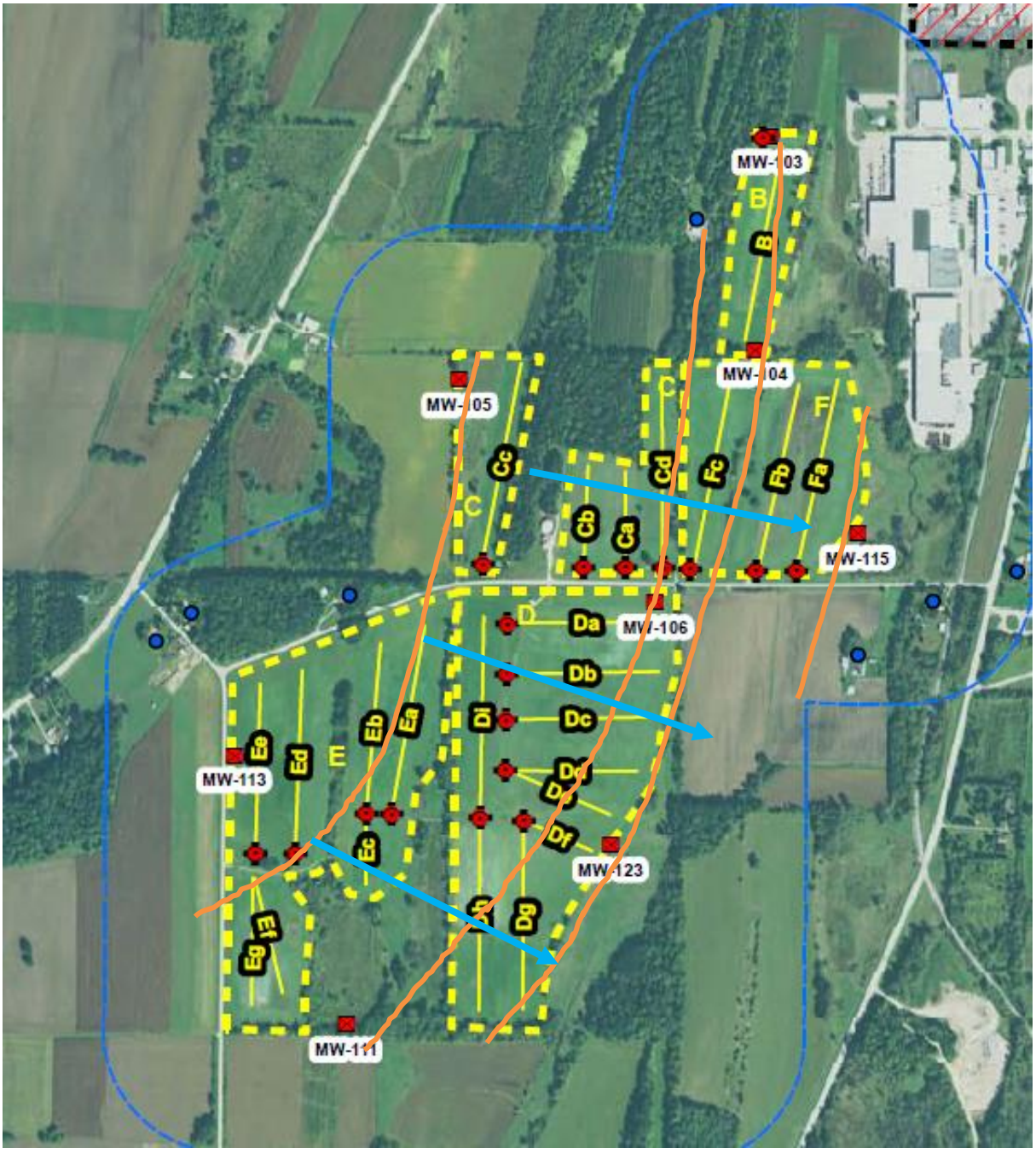
South Spray Fields G and H are monitored by wells W-116 (886), W-117 (887), W-118 (888), W-119 (889), W-120 (890), W-121 (891) and W-122 (892). W-116 (886) is considered the background well based on the groundwater flow gradient of the current groundwater monitoring system. W-118 (888), W-119 (889), W-120 (890), W-121 (891) and W-122 (892) are downgradient wells and W-117 (887) is a side gradient well. W-117 (887), W-119 (889), W-120 (890), W-121 (891) and W-122 (892) are considered enforcement standard wells for fields G and H, based on their distance from edge of the land treatment system and/or location in relationship to the site (property) boundary.

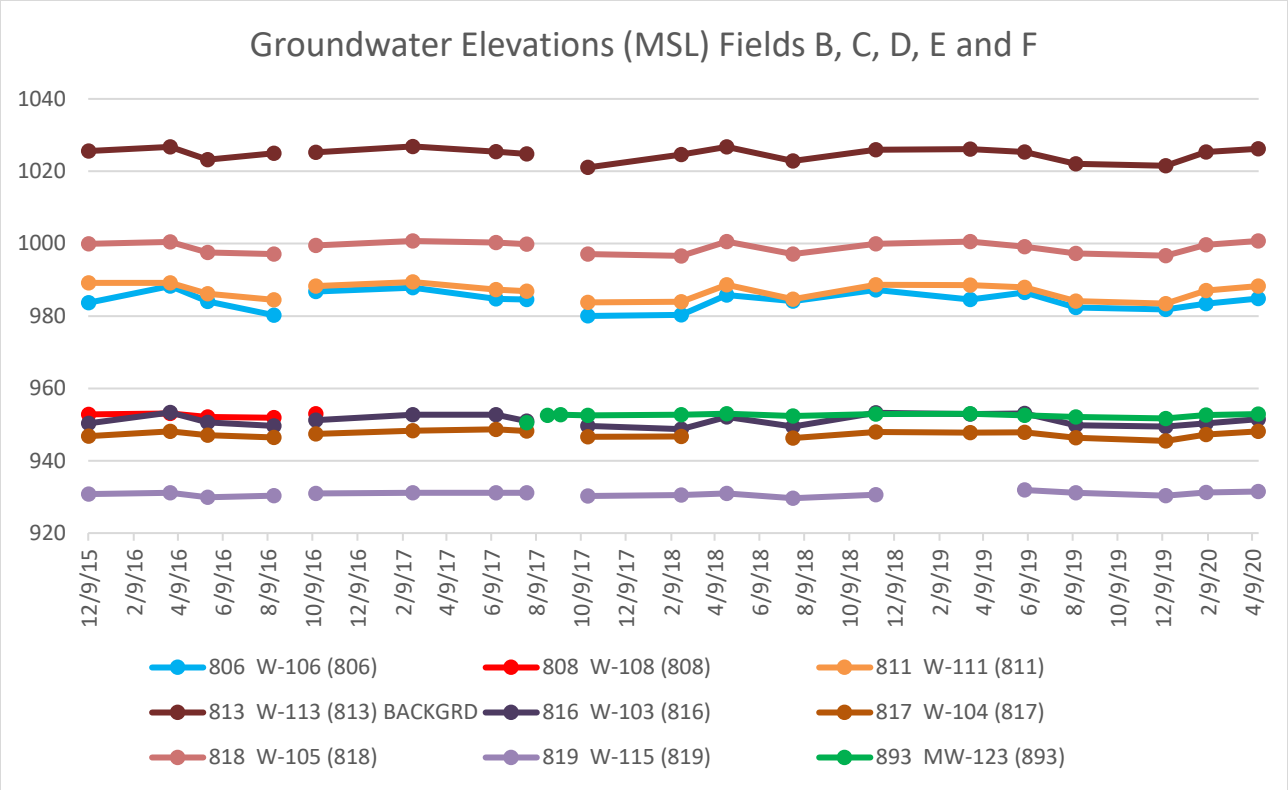
Printed on Recycled Paper

Site Map


MW-103
MW-104
MW-105
MW-115
MW-106
MW-113
MW-123
MW-111
Outfall 013
MW-117
MW-121
MW-122
MW-116
Outfall 014
MW-119
MW-120
0 1,000 2,000 4,000
Feet
Monitoring Well
Hydrants
Sprayfields
TravelLane
TileOutfall
Process Facility
Private Well
1000ft Offset
APPLIED SCIENCE, INC.
SCIENCE • ENGINEERING • MANAGEMENT
2802 PERRY STREET MADISON, WI 53713
(608) 278-9933
SITE FEATURES MAP
SENECA FOODS CORPORATION
MAYVILLE, WISCONSIN
FIGURE NO.
3
DRAWN
RCW
CHECKED
NPH
APPROVED
NPH
REVISED
10/2/2020
PROJECT NO.
C12901
FILE
2020Fig3

Groundwater Flow Fields B, C, D, E, and F





Fields B, C, D, E and F

The following groundwater limits for Central Fields B, C, D, E and F are contained in the latest Seneca Foods Mayville WPDES permit which will expire on March 31, 2021:

Parameter	**PAL or ACL**	**ES**	**Source**
Chloride	250 mg/L (ACL)	250 mg/L	Calculated, Table 2, NR 140
COD	37 mg/L	N/A	Calculated
Ammonia Nitrogen	0.97 mg/L	9.7 mg/L	Table 1, NR 140
NO_2-NO_3,N	3.2 mg/L	10 mg/L	Calculated, Table 1, NR 140
Organic Nitrogen	2.3 mg/L	N/A	Calculated
pH, Field	6.4-8.4 su	N/A	Calculated
TDS	940 mg/L	N/A	Calculated
Sulfate	150 mg/L	250 mg/L	Calculated, Table 2, NR 140

The following groundwater limits are recommended for the upcoming permit. Calculated values are based on groundwater data from background well W-113 (813):

Parameter	PAL or ACL	ES	Source
Chloride	240 mg/L (ACL)	250 mg/L	Calculated, Table 2, NR 140
COD	33 mg/L	N/A	Calculated
Ammonia Nitrogen	0.97 mg/L	9.7 mg/L	Table 1, NR 140
NO_2-NO_3, N	4.6 mg/L (ACL)	10 mg/L	Calculated, Table 1, NR 140
Organic Nitrogen	2.3 mg/L	N/A	Calculated
pH, Field	6.4-8.4 su	N/A	Calculated
TDS	690 mg/L	N/A	Calculated
Sulfate	150 mg/L (ACL)	250 mg/L	Calculated, Table 2, NR 140

Background well(s): W-113 (813)
Background Groundwater Quality: Chloride and Nitrate+Nitrite-N concentrations are the parameter above expected background levels however the concentrations have improved some since last permit term. The mean Chloride concentration was 88 mg/L with a range of 28-117 mg/L for the December 2015-April 2020 time frame. The mean Nitrate+Nitrite-N concentration was 1.5 mg/L with a range of 0.43-3.8 mg/L for the December 2015-April 2020 time frame.

Known or suspected background contaminant sources: Local up gradient agricultural activities are the likely source of background NO_2-NO_3, N groundwater impacts above NR 140 PAL's. W-113 is located near public roads that may receive deicer in winter months as the likely source of background Chloride groundwater impacts. Background well W-113 and downgradient well W-111 are constructed in the unconsolidated glacial deposits but located downgradient of an isolated Silurian Dolomite unconfined bedrock aquifer deposit. This Silurian Dolomite aquifer has natural occurring elevated sulfate groundwater concentrations from the gypsum deposits within the formation. Therefore, the suspected ongoing sulfate concentrations present in background well W-113 and downgradient well W-111 are likely due to being located close to this Silurian Dolomite aquifer deposit.

Alternative Concentration Limits (ACLs): In the current permit, the background ACL for Chlorides, Sulfate and Nitrite+Nitrate-N was based on values from W-113 (813). The proposed background ACLs have been recalculated using the same monitoring point and the most current data, the limits changed slightly for Chloride and Nitrite+Nitrate-N, Sulfate was unchanged.

Exceedance Report Central Fields B, C, D, E and F

This exceedance report is based on PALs, ACL and ESs contained in the permit that will expire on March 31, 2021. The sample date range was from December 2015 – April 2020.

W-103 (816) Side Gradient well – No Exceedances

W-104 (817) Downgradient well – No Exceedances

W-105 (818) Upgradient well

3 of 3 sample results exceeded the ES of 10 mg/L for NO_2-NO_3, N.

W-106 (806) Downgradient well

15 of 19 samples exceeded the ACL and ES of 250 mg/L for Chlorides. The mean Chloride concentration of all samples from this well was 275 mg/L.

4 of 19 sample results exceeded the PAL of 940 mg/L for TDS.

W-111 (811) Downgradient well

3 of 19 sample results exceeded the PAL of 940 mg/L for TDS.

17 of 19 sample results exceeded the PAL of 150 mg/L for sulfates. 10 results exceeded 250 mg/L ES.

W-115 (819) Downgradient well – No Exceedances

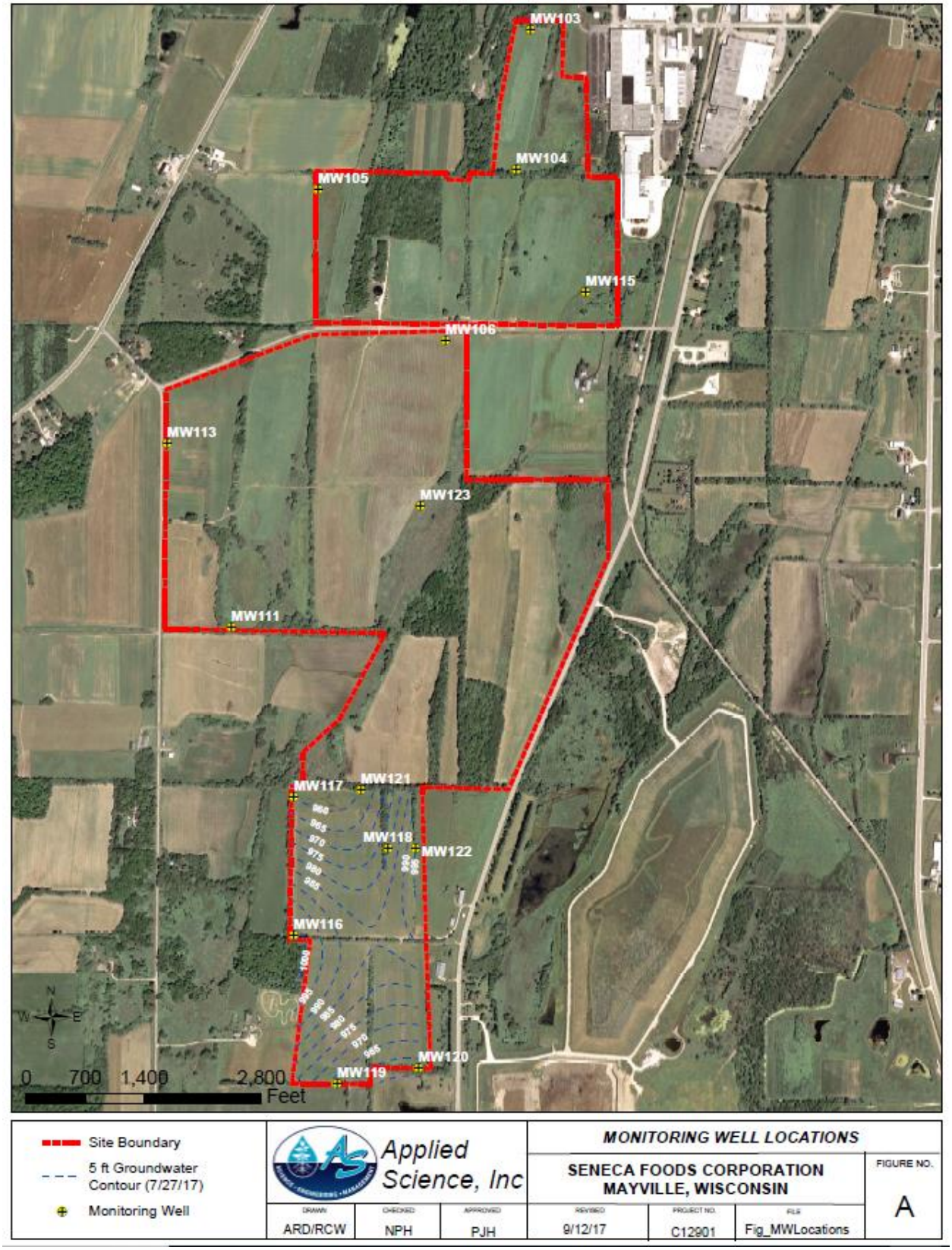
W-123 (893) Downgradient well

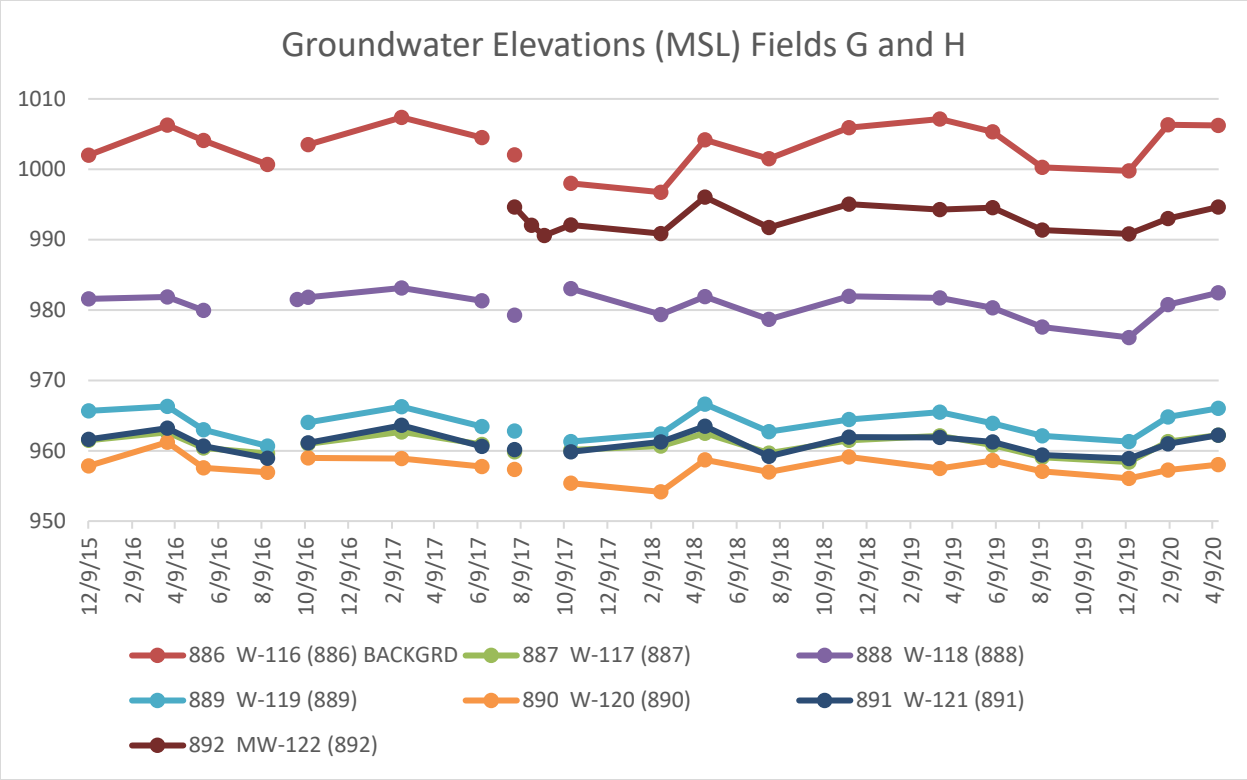
1 of 14 sample results was outside the PAL range of 6.4-8.4 su for field pH.

Point of standards for compliance with NR 140 ES: Groundwater enforcement standards can be applied at monitoring wells W-103 (816), W-111 (811) as these wells are located at the property boundary line or beyond the 250 feet DMZ.

Monitoring Recommendations: Continue quarterly groundwater monitoring frequency for the same parameters at all the wells in this system.

Groundwater Flow Fields G and H





South Fields G and H

The following groundwater limits for Central Fields G and H are contained in the latest Seneca Foods Mayville WPDES permit which will expire on March 31, 2021:

Parameter	**PAL or ACL**	**ES**	**Source**
Chloride	140 mg/L	250 mg/L	Calculated, Table 2, NR 140
COD	32	N/A	Calculated
Ammonia Nitrogen	0.97 mg/L	9.7 mg/L	Table 1, NR 140
NO_2-NO_3, N	2.2 mg/L	10 mg/L	Calculated, Table 1, NR 140
Organic Nitrogen	2.3 mg/L	N/A	Calculated
pH, Field	6.4-8.4 su	N/A	Calculated
TDS	620 mg/L	N/A	Calculated
Sulfate	170 mg/L (ACL)	250 mg/L	Calculated, Table 2, NR 140

The following groundwater limits are recommended for the upcoming permit. Calculated values are based on groundwater data from background well W-116 (887):

Parameter	PAL or ACL	ES	Source
Chloride	140 mg/L (ACL)	250 mg/L	Calculated, Table 2, NR 140
COD	32 mg/L	N/A	Calculated
Ammonia Nitrogen	0.97 mg/L	9.7 mg/L	Table 1, NR 140
NO_2-NO_3, N	2.1 mg/L (ACL)	10 mg/L	Calculated, Table 1, NR 140
Organic Nitrogen	2.2 mg/L	N/A	Calculated
pH, Field	6.3 - 8.3 su	N/A	Calculated
TDS	600 mg/L	N/A	Calculated
Sulfate	160 mg/L (ACL)	250 mg/L	Calculated, Table 2, NR 140

Background well(s): W-116 (887)
Background Groundwater Quality: Nitrate+Nitrite-N concentrations is the only parameter above expected background levels however the concentrations have improved since last permit term to a point that none of the sample results exceed the NR 140 PAL's.

Known or suspected background contaminant sources: In the past local up gradient agricultural activities were considered the likely source of background NO_2-NO_3, N groundwater impacts above NR 140 PAL's.

Alternative Concentration Limits (ACLs): In the current permit, the background ACL for Chloride, Nitrite+Nitrate-N, and Sulfate was based on values from W-116 (887). The proposed background ACLs have been recalculated using the same monitoring point and the most current data. Based on the results the limits changed slightly for Chloride, Nitrite+Nitrate-N and Sulfate.

Exceedance Report South Fields G and H

This exceedance report is based on PALs, ACL and ESs contained in the permit that will expire on March 31, 2021. The sample date range was from December 2015 – April 2020.

W-117 (887) Side Gradient - No Exceedances

W-118 (888) Downgradient

3 of 8 sample results exceeded the PAL of 620 mg/L for TDS.

W-119 (889) Downgradient - No Exceedances

W-120 (890) Downgradient

1 of 19 sample results exceeded the PAL of 620 mg/L for TDS. There is a downward trend in the TDS concentration since March 2008.

W-121 (891) Downgradient - No Exceedances

W-122 (892) Side gradient

1 of 14 sample results exceeded the PAL of 620 mg/L for TDS.

Point of standards for compliance with NR 140 ES: Groundwater enforcement standards can be applied at monitoring wells W-117 (887), W-119 (889), W-120 (890), W-121 (891) and W-122 (892) as these wells are located at the property boundary line or beyond the 250 feet DMZ.

Monitoring Recommendations: Continue quarterly groundwater monitoring frequency for the same parameters at all the wells in this system.

Discussion

Fields B, C, D, E and F

Chlorides

Background well W-113 has relatively high Chloride concentrations. The mean Chloride concentration in the background well was 88 mg/L with a range of 28-117 mg/L for the current permit term (December 2015-April 2020) and resulting in an alternate concentration limit of 250 mg/L.

The mean Chloride concentration for W-106 during the current permit term is 275 mg/l with a range of 172 – 321 mg/l. The mean Chloride concentration in W-106 for the March 2001-November 2010 time frame was 316.3 mg/L with a range of 21-690 mg/L with all but one sample in the 170-690 mg/L range. The mean Chloride concentration in W-113 was 230.5 mg/L with a range of 160-350 mg/L for the same time frame.

The mean effluent Chloride concentration for 1999-2004 was 222.98 mg/l if all data was included. If the three erroneously high effluent sample results over 800 mg/L are excluded the mean effluent Chloride concentration drops to 168.5 mg/L. The mean effluent Chloride concentration for 2005 through 2010 was 160.7 mg/L. In addition, the mean effluent Chloride concentration from 2010 – present has now dropped to 125 mg/L. Based on all the mean Chloride effluent concentrations referenced above it continues to appear that there may be other historic and current sources of Chloride that affect groundwater near Background well (813) W-113 and downgradient well W-106 (806). (Chloride effluent data charts are provided in the Appendix below)

Since Background well W-113 (813) and downgradient well W-106 (806) are located near public roads that may receive deicer in winter months, the department therefore considers winter deicing as the likely other source of Chloride groundwater impacts at these two monitoring points.

As Chloride concentrations in the rest of the downgradient/side gradient monitoring wells (W-103 (816), W-108 (808), W-111 (811), (W-115 (819) and W-123(893)) ranged between 6.3 and 107 mg/L during the permit term. Note: W-103 (816) and W-111 (811) are considered enforcement standard wells and their chloride concentrations ranged between 6.3 and 21 mg/L.

Nitrogen Parameters

The mean Nitrate+Nitrite-N concentration in background well W-113 was 1.5 mg/L with a range of 0.43-3.8 mg/L for the December 2015-April 2020 time frame resulting in an alternate concentration limit of 4.6 mg/L.

The downgradient wells surrounding Fields B, C, D, E and F all had very low NO_2-NO_3,N sampling results during the permit term as none of the results exceed 1.0 mg/l. There was essentially no ammonia nitrogen detected and little organic nitrogen detected in all the downgradient monitoring wells.

The Department identified NR 140 groundwater exceedances at the facility's groundwater monitoring system for NO_2-NO_3, N in well W-105 with a range of 11-33 mg/L. Monitoring well W-105 is not considered an ES well even though it is approximately 250' from the edge of wastewater disposal Field C near the northwest corner of the property boundary line. W-105 (818) happens to be located on the other side of a drainage way (intermittent stream) from Field C. This well also has the second highest groundwater elevation in this monitoring system, which makes this well up/side gradient of the facility's land treatment system. Based on the current available information, the Department considers the source of the elevated NO_2-NO_3, N impacts in monitoring well W-105 to be unrelated to the facility's land treatment system due to the facility's low Nitrogen effluent data and the well's 20 foot distance from an agricultural field.

South Fields G and H

The only area of concern for south fields G and H was the COD concentrations in wells W-118 and W-120. The COD sample results exceeded 100 mg/L in December 2009, August 2010 and November 2010 in W-118 and in March and November 2010 in W-120. Other monitored parameters did not mirror the COD data. Since the last permit term an additional monitoring well W-122(892) was installed to define the degree and/or extent of contamination near W-118. The mean COD concentration in the new well W-122 was 8.8 mg/L with a range of 6.7-22.2 mg/L for the July 2017-April 2020 time frame. Therefore, the extent of the elevated COD concentrations appears to be defined based on the installation of the new monitoring well W-122, the facility is in compliances with groundwater standards.

Recommendations

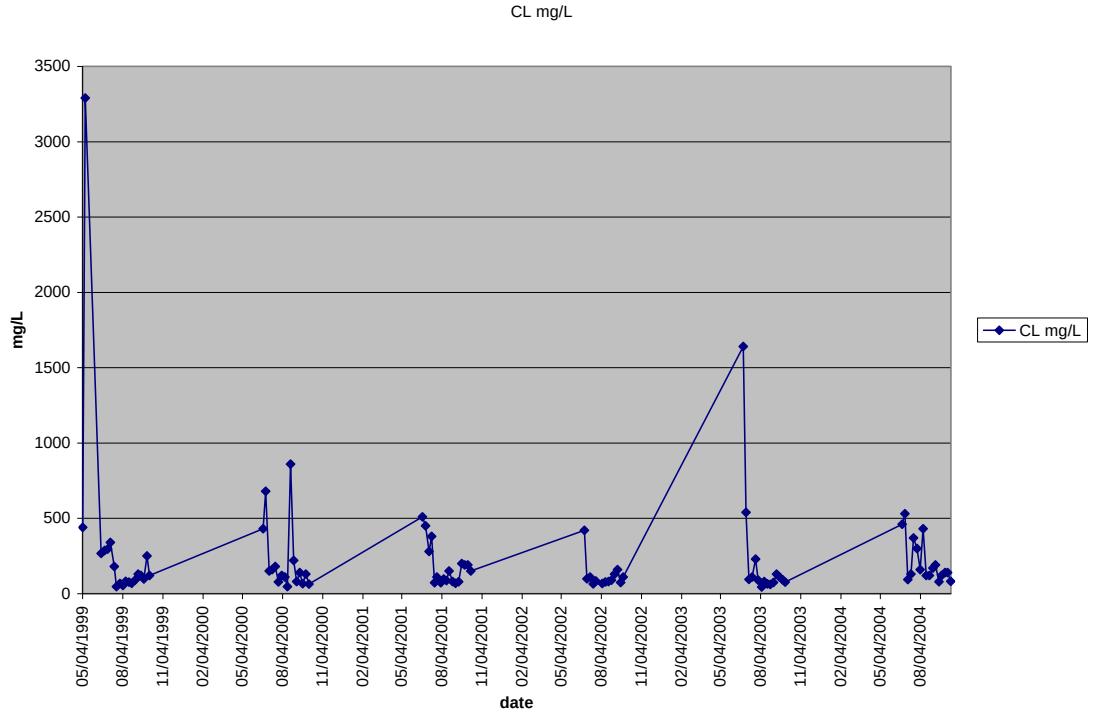
- That the Seneca Foods Mayville facility be considered in substantial compliance.

- Seneca Foods Mayville should continue implementing Chloride reduction efforts to limit the discharge to groundwater. The Basin Engineer and Permit Drafter may choose to include a separate compliance schedule in the permit relating to Chloride reduction or have these ongoing reduction efforts be included with the land treatment annual reports.

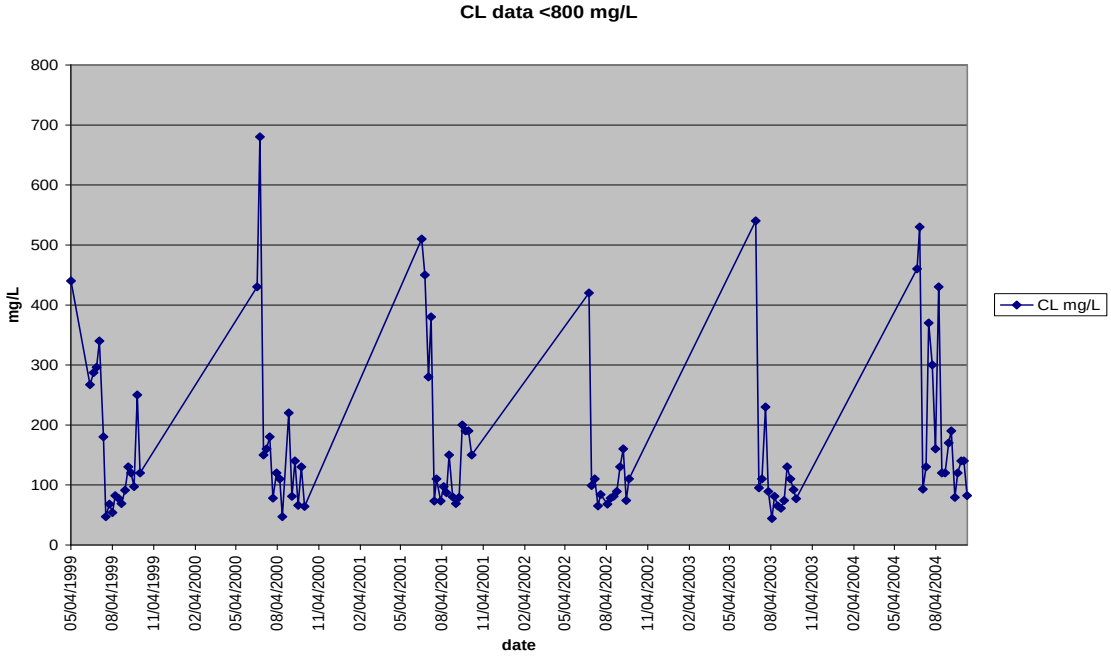
- Continue groundwater monitoring at the same frequency and for the same parameters as in the current permit, except for up/side gradient monitoring well W-105 (818) and W-118 (888) which only needs to be monitored quarterly for groundwater elevations and depth to groundwater.

Appendix

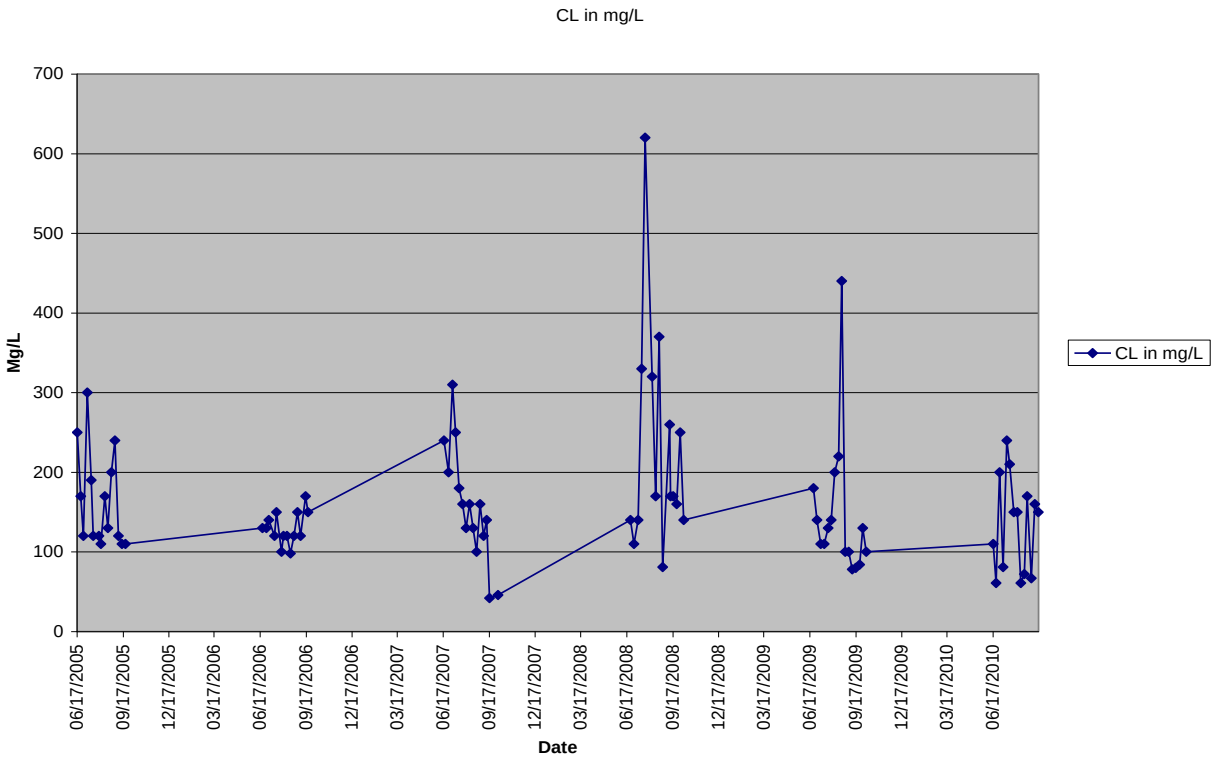
Effluent Chloride Data 1999-2004



Effluent chloride data < 800 mg/L 1999-2004



Effluent Chloride Data 2005-2010



Effluent Chloride Data 2010-2020